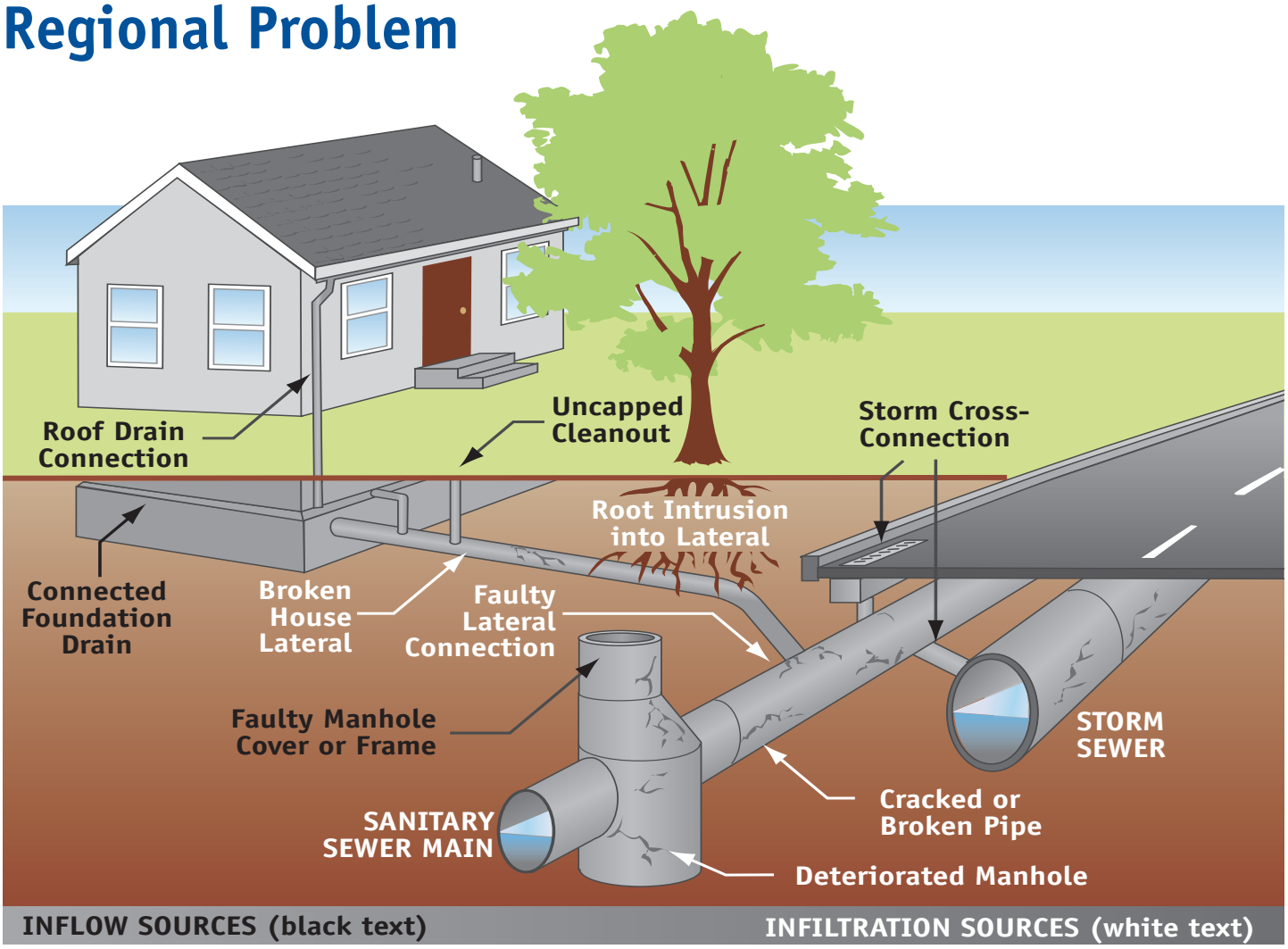
Storm Water & Ground Water in Sewers is Regional Problem



What is Infiltration and Inflow and Why is it a Problem?

Excess water that flows into sewer pipes from groundwater and stormwater is called **Infiltration and Inflow**, or I/I. Groundwater (infiltration) seeps into sewer pipes through holes, cracks, joint failures, and faulty connections. Stormwater (inflow) rapidly flows into sewers via roof drain downspouts, foundation drains, storm drain cross-connections, and through holes in manhole covers. Most I/I is caused by aging infrastructure that needs maintenance or replacement.

The King County Wastewater Treatment Division estimates that I/I makes up 75 percent of peak flows in the sewer system during winter storms – and that much of this I/I originates on private property.

Excess water in the sewer system is a problem because:

- It takes up capacity in the sewer pipes and ends up at the regional wastewater treatment plants where it must be treated like sewage, resulting in higher treatment costs.
- Requires new and larger wastewater facilities to convey and treat the larger volumes of flow, resulting in higher capital expenditures.
- I/I flows contribute to sewer system overflows into local homes and the region's waterways, negatively impacting public health and the environment.

Protecting the environment and decreasing wastewater treatment costs are the benefits of a regional I/I control program.

King County I/I Control Program

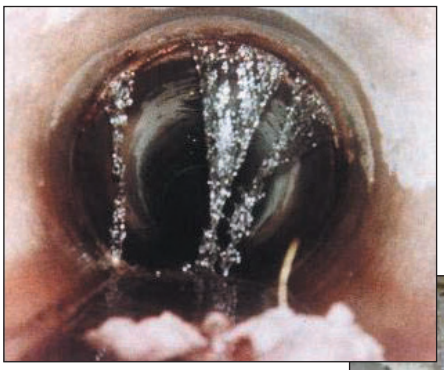
In 2000, King County, in partnership with 17 cities and 17 sewer utilities that collect sewage in the King County region, launched a program to develop a cost-effective approach to controlling I/I. An initial phase of the program evaluated alternatives and tested solutions, resulting in the Executive's Recommended I/I Control Program, approved by the King County Council in early 2006.

The purpose of the program is to reduce the amount of peak wet weather flow entering the county's wastewater conveyance system when it is cost-effective to do so. Reduction of I/I in the system has the potential to lower the risk of sanitary sewer overflows and decrease the costs of conveying and treating wastewater.

In accordance with the adopted I/I Control Program, King County will work with the local sewer agencies to:

- Conduct an I/I reduction feasibility analysis in 2007-08 in four candidate project areas, see map.
- Select and implement 2-3 initial I/I reduction projects in 2010-11 to test the cost-effectiveness of I/I reduction on a scale large enough to potentially offset the need for larger conveyance or storage facilities.
- Analyze the results of these initial projects and make recommendations to the King County Council regarding long-term I/I reduction and control, including applicable changes to policy or code.

Infiltration



Cracked sewer pipe

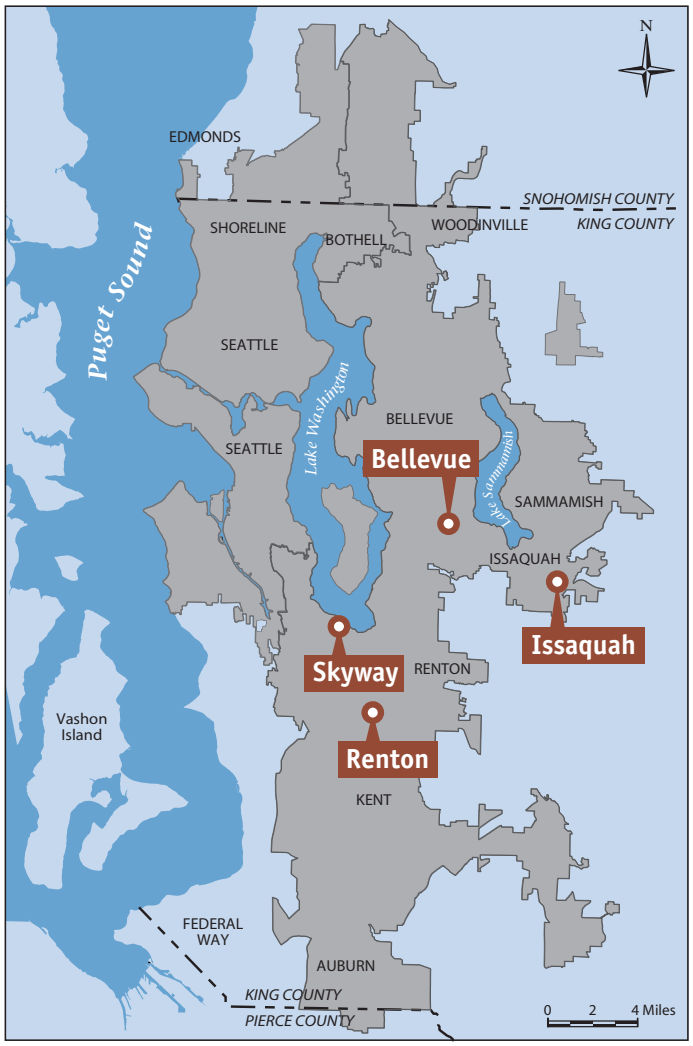
Inflow

Downspout connected directly to sanitary sewer

Initial I/I Reduction Projects

During 2010-2011 King County will construct I/I reduction projects in up to three areas, selected from four candidate project areas shown on the map below. Details about these projects will be determined during the design phase in 2009. While some of the sewer rehabilitation work will focus on the public portions of the sewer system (sewer mains and manholes), much of the rehabilitation work will happen on private side sewers and will require the cooperation of private property owners. King County and the local sewer agencies will work closely with the affected communities during the design and implementation of the projects.

To minimize the amount of excavation in neighborhoods, King County will use less invasive trenchless rehabilitation techniques, as described on the right, whenever possible.



Candidate Project Locations

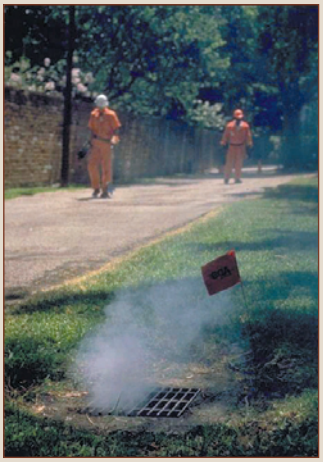
Candidate Project Locations

King County Wastewater Service Area

Finding I/I

Flow monitoring and modeling can help identify areas of high flows during wet weather, indicating the presence of I/I. Additionally, sewer system evaluation surveys (SSES) can be used to examine the condition of private side sewers and help to identify likely sources of I/I. SSES methods include smoke testing, closed circuit television (CCTV) inspection, and occasionally dye testing.

CCTV cameras can be robotically sent down sanitary sewer lines and along each side sewer to record a video of sewer conditions. CCTV inspections can identify breaks, root intrusion, leaking water and deteriorating conditions.



Smoke Testing involves pumping smoke through sewers from manholes in streets and observing where smoke exits. The exiting smoke can indicate a broken pipe or where roof or foundation drains might be illegally connected to the sewer system.

Dye Testing involves pouring non-toxic fluorescent colored dye down roof drains or catch basins to see if that dye makes its way into the sewer.

Fixing I/I

Once an I/I problem has been identified, there are many methods and technologies available to reduce I/I. One primary method focuses on fixing the broken pipes, manholes, and joint connections. Another focuses on reducing the amount of I/I that enters the sewer system from storm events by disconnecting roof drain downspouts and other building or yard drains that may be directly connected to the sewer.

Trenchless Technologies

Pipe bursting of private side sewer line

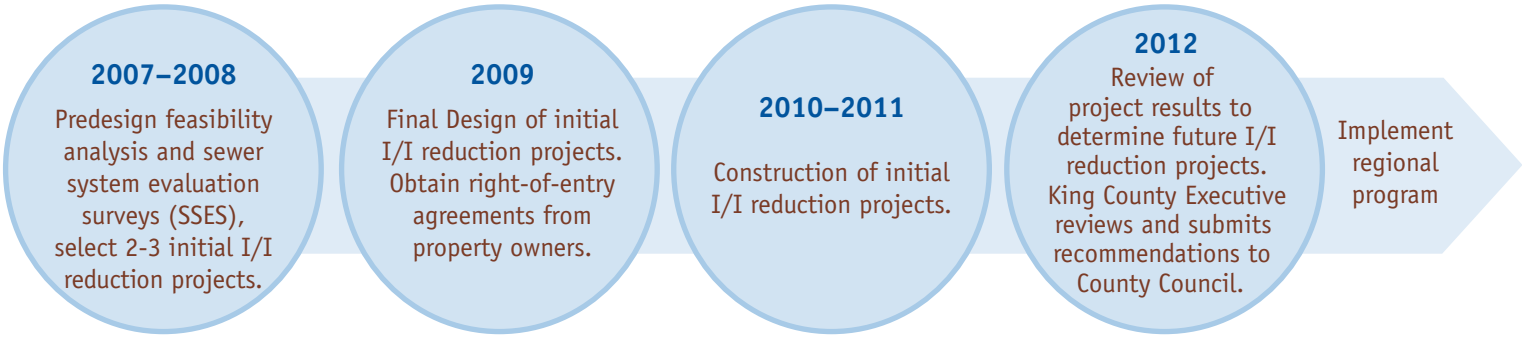
Trenchless technology pipe repair methods may include pipe bursting, or cured-in-place pipe (CIPP). Pipe bursting is a technique that pulls a hardened steel breaker head through the old pipe, breaking it up, and replacing it with a new pipe all in one process.

CIPP repair involves pulling a resin-saturated liner through a damaged pipe which is then cured with steam or hot water to form a tight-fitting, jointless replacement pipe. Trenchless repair methods require less digging than traditional "dig and replace" repair methods and minimize damage to yards and landscaping.

Stormwater Disconnections

Stormwater connections such as roof drain downspouts, yard drains, and sump pumps may be disconnected from the sewer system and redirected to a separate stormwater system.

Regional Infiltration/Inflow Program Milestones



Local Agency Involvement

King County and 34 local sewer agencies are working to develop and implement cost-effective I/I management strategies and projects. The cost-effectiveness and feasibility of the initial I/I reduction projects will help determine how a regional I/I program will be carried out in future years. The following is a list of local sewer service providers in the King County regional sewer system:

- Alderwood Water & Wastewater District
- City of Algona
- City of Auburn
- City of Bellevue, Utility Services
- City of Black Diamond
- City of Bothell
- City of Brier
- City of Carnation
- Cedar River Water & Sewer District
- Coal Creek Utility District
- Cross Valley Water District
- Highlands Sewer District
- City of Issaqaquah
- City of Kent
- City of Kirkland
- City of Lake Forest Park
- Lakehaven Utility District
- City of Mercer Island
- Muckleshoot Indian Tribe
- Northeast Sammamish Sewer & Water District
- Northshore Utility District
- Olympic View Water & Sewer District
- City of Pacific, Public Utilities
- City of Redmond
- City of Renton
- Ronald Wastewater District
- Sammamish Plateau Water & Sewer District
- City of Seattle, Public Utilities
- Skyway Water and Sewer District
- Soos Creek Water & Sewer District
- City of Tukwila
- Valley View Sewer District (formerly Val Vue Sewer District)
- Vashon Sewer District
- Woodinville Water District

What Can You Do?

- Inspect your roof gutters and downspouts to see if they are connected to the sewer system. If so, have them disconnected. Direct downspouts onto lawn and garden beds, or to rain barrels. Resources: http://dnr.metrokc.gov/wlr/PI/rainbarrels.htm; http://www.dcgreenworks.org/LID/downspout.html
- To get more information about the King County I/I Control Program or the Initial I/I Reduction Projects, contact King County staff:
  - **Maryann Petrocelli**, Community Relations Planner, **206-263-7321**, or **maryann.petrocelli@kingcounty.gov**
  - **Erica Jacobs**, I/I Control Project Manager, **206-684-1138**, or **erica.jacobs@kingcounty.gov**
- Visit the King County Web site at http://dnr.metrokc.gov/wtd/i-i
- Contact your local sewer service provider. For a list of local agency web sites visit *http://dnr.metrokc.gov/wtd/mwpaac/index.htm*

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

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